A Synopsis On

FARMLAND SUITABILITY ASSESSMENT OF SUGARCANE IN SANGLI DISTRICT: A GEOGRAPHICAL STUDY

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INTRODUCTION

"The science , art or practice of cultivation the soil, producing crop and raising livestock and in varying degrees the preparation and marketing of the resulting product cleared the land to use for agriculture.''(Merriam and Webstar). Agriculture is the key of development in the rise of sedentary human civilization, whereby farming of homely species created food surpluses that nurtured the development of civilization. It is the science or practice of farming, including cultivation of the soil for the growing crops and the rearing of animals to provide food, wool, and other various products. The history of agriculture is back thousands of years, and its development has been driven and defined by greatly different climates, cultures, economic and technologies. Until the Industrial Revolution, the vast majority of the human population laboured in agriculture. Pre-industrial agriculture was typically subsistence agriculture self-sufficiency in which farmers raised most of the crops for their own consumption instead of crop for trade. A considerable shift in agricultural practices has occurred over the past century in response to new technologies, and the develop of world markets. Agriculture, being the most primitive occupation of the civilized man, attractive much on its development starting from the shifting cultivation to advanced precision farming. With the advancement in the civilization manmade to settle at one place and cultivate to the same area year after year. Now agriculture to become a profession is given the name commercial agriculture, precision agriculture and sustainable agriculture. Agriculture may include cultivating the soil, growing and harvesting crops, and raising livestock. Agriculture was independently developed in many places, including the Middle East, East Asia, South Asia, and the Americas etc. The earliest evidence for agriculture had been found in the Middle East and dated to between 14,500 and 12,000 BP. Early cultivators include wild barley (Middle East), millet (China), and squash (the Americas). The domestication of many animals now considered to be livestock occurred during roughly the same period, although dogs

were domesticated considerably earlier. Slash-and burn land-clearing methods and rotation of crop were early agricultural techniques. Steady improvements in tools and methods over the centuries increased agricultural output, as did mechanization, selective breeding and hybridization, and onset in the 20th century, the use of herbicides and insecticides.

Generally all farming relies on techniques to spread and maintain the lands. The Modern agronomy, plant breeding, agrochemicals such as pesticides, fertilizers, and technological improvements have sharply increased yields from cultivation. This suitability is function of crop requirements and soil, land characteristics. Matching the land characteristics with the crop requirements give the suitability. So, 'Suitability is measure of how well the qualities of land unit match the requirements of particular form of land use,' (FAO). Besides the land, soil characteristics socio-economic, market and infrastructure characteristics are the other driving forces that can influence the crop selection. "The quality of having the properties that is right of a specific purpose; "an important requirement is suitability for long trips" "The quality of having the properties that are right for a specific purpose; "the quality of being allow able, proper, or fit" Suitability refers to a specifically defined usage or practice, such as suitability for corn, suitability for golf courses, or for particular government building schemes. Suitability techniques are essential for informed strategic decision-making (Steiner et al., 2000; 1991).

FARMLAND SUITABILITY ASSESSMENT:-

Farmland suitability assessment is the phenomena of better interaction between physical, regional and socio-economic factors, Land suitability assessment is a planning approach to avoid environmental conflicts by the segregation of competing land uses (Eastman et al., 1993). Initially, this tool was developed as a means of relating spatially independent factors within the environment and, consequently, provided a more holistic view of their interaction (Steiner et al., 2000). Land suitability is determined by both the fitness of the land for a particular use and the values and interest of the stakeholders in a region (Steiner et al., 2000; Bojorquez-Tapia et al., 1999). Initially, this tool was developed as a means of relating spatially

independent factors within the environment and, consequently, provided a more holistic view of their interactions (Steiner et al., 2000). The objective of land suitability assessment is "to assist decision makers in finding the most appropriate locations or pattern of location for fulfilling the goals for the involved stakeholders" (Bojorquez-Tapia et al., 1999). There are generally two kinds of land suitability assessment approaches. First, the qualitative approach is used to assess land potential at a broad scale or is employed as a preliminary method for more detailed investigation (Baja, 2002; Dent and Young, 1981). The results of qualitative classification are given in qualitative terms, such as highly suitable, moderately suitable, and not suitable. The qualitative factors could not use the numerical score to present. Second, the quantitative approach is using parametric techniques involving more detailed land attributes which allow various statistic analyses to be performed (Baja, 2002; 2001). Recently, most studies combined the qualitative and quantitative approaches in the process of land suitability assessment. The compositive technology including expertise, mathematic model and GIS has been used in the land suitability assessment (Malczewski, 2004; Yang and Jia, 2002; Chen, 2002, Bydekerke et al., 1998). Now, suitability assessment helps land managers make decisions and establish polices for the utilization of particular land areas. It is a strategic process directed at the evaluation of the natural resources, and the regulation of human activities in a region (Steiner, 1991).

STUDY REGION

Sangli district is one of the southernmost district of Maharashtra state. it is situated between the longitudes of 73˚ 41' E and 75˚ 41' E and the latitudes of the 16˚ 45' N and 17˚ 33' N the district is bounded by Satara district on northwest side. the Solapur district on the northeast side. on the southern side it is bounded by Belgaum district and Bijapur district of Karnataka state. Kolhapur district in the west. the Ratnagiri district line on the west of Sangli district.

The district can be divided into 3 broad physiographic divisions

1) The hilly region of the western part
2) The river plan

3) The undulating land of eastern part

The average rainfall of the district is 67 cm. and the rainfall is highest at shirala and it is geos on decreasing toward the Eastern part of district. Agriculture is the main study of economy in the sangli district about 67 % of the total worker are engage in agriculture the district famous crop are sugarcane, bor, turmeric and vegetables.

OBJECTIVES:

The primary purpose of this study is to assessment of suitability of sugarcane in Sangli District. This research thesis has the following objectives:

1) To study the Geographical Settings of the study region.
2) To assess the suitability of sugarcane in study area.
3) To study of the problem of agriculture in study area.
4) To study of the agriculture development in study area.
5) To study of distribution of sugarcane in study area.
6) To suggest better suggestions for increase the sugarcane farmland in study area.

HYPOTHISIS

1) The area of sugarcane increase with increase availability of water.
2) The area of sugarcane is maximally distributed in those area, where suitable factors are found.

DATA COLLECTION

Geography is a science, based on empirical which requires data collection from various sources. Since it is not possible for individual to conduct sugarcane data and collect detailed data from farm to farm. The research data is reliable and accurate the same has been used for this study. The required secondary data will collected from following sources-

1) The district Gazetteer of Sangli.
2) Groundwater Survey Development Agency (GSDA).

3) Socio-Economic Abstracts of Sagali Districts.
4) Agricultural Office Report, Sangli District
5) Esro - Bhuvan RS Satellite imagery data.

In the present study, tahsil has been considered as a basic unit of investigation. The collected data will be tabulated and analysed by using various statistical techniques, wherever, necessary data will be presented with the help of suitable cartographic techniques like line graph, bar graph etc.

RESEARCH METHODOLOGY

Suitability analysis in a GIS context is a geographic or GIS based process used to determine the appropriateness of a given area for a particular use. The basic premise of GIS suitability analysis is that each aspect of the landscape has intrinsic characteristics that are in some degree either suitable or Unsuitable for the activities being planned. Suitability is determined through Systematic, multi-factor analysis of the different aspect of the terrain. Model Inputs include a variety of physical, cultural, and economic factors. The results are often displayed on a map that is used to highlight areas from high to low Suitability

A GIS suitability model answers the question, "Where is the best location? " Whether it involves finding the best site for sugarcane. Quantitative assessment as well as qualitative assessment is used to be identifying suitability of the site. For land suitability assessment we have choose certain indicators and make the rank determine from percentage, where, the highest percentage involves first rank and after this, ranks are taken in decreasing order. It includes first, second, third and so on ranking of crops. Indicators choose to derive certain conclusion are:

1) Water Resources
2) Industries
3) Groundwater Level
4) Transportation
5) Education
6) climate – Rainfall and Temperature

7) Availability of chemical fertilisers
8) Benefits
9) Land suitability for the entire areas categories are made as:
    a) High suitability
    b) Medium suitability
    c) Low suitability

LITERATURE REVIEW:

1) **Guillermo A.** Mendoza in the paper "A GIS-baseedmulticriteria approaches to land use suitability assessment and allocation." discussed the land use suitability and land use allocations in a Geographic Information System (GIS) environment. It is formulated as a multi-criteria decision making 10 (MCDM) problem. This paper proposes an alternative approach to site suitability analysis.
2) **M.D. Laffan** in paper " A Methodology for Assessing and Classifying Site Productivity and Land Suitability for Eucalypt Plantation in Tasmania" , considering the classification which are based on assessment of land qualities which can be determined from characteristics measured during land resource surveys. Four classes of land suitability are defined, based on guidelines for land evaluation published by the Food and Agriculture Organization. Class 1 (highly suitable) has no significant limitations for plantation productivity or use, whereas Classes 2, 3 and 4 (moderately suitable, marginally suitable, unsuitable) have significant limitations, or hazards of increasing severity. Classes 2 and 4 are divided into subclass which indicate the kind of limitation affecting for plantations
3) **Reza Banai-Kashaniin** paper "A new method for site suitability analysis: The analytic hierarchy process" introduces a new method, the analytic hierarchy process (AHP) with which error in judging the relative importance of factors in site suitability analysis can be both detected and corrected. The proposed approach is illustrated with an example to show how the AHP frames the site evaluation problem and can aid in decision making involving multiple criteria,

factor diversity, and conditions of uncertainty. The article concludes by suggesting the potential application of the AHP in public choice decisions involving complex, controversial, and conflictual site selection processes.

4) **AtesmachewBizuwerk and Don Peden** in paper “GIS Application for analysis of Land Suitability and Determination of Grazing Pressure in Upland of the Awash River Basin, Ethiopia.” an attempting to identify suitable areas for livestock, crop production and forest by incorporating different spatial information using GIS techniques. Based on the analysis an attempt was also made to determine the grazing pressure in upland of the Awash River basin. The result showed that areas, which are very near to water points and dominated by low slope gradients, were identified as most suitable to agricultural crop production.
5) **Yao Mu** in the thesis “ Developing a Suitability Index for Residential Land Use: A case study in Dianchi Drainage Area”, discussed the conflict between residential land and agriculture land in China is increasingly sharpened, especially when some urban development began to sprawl to the suburban and rural areas. In order to plan land resources properly, land suitability assessment is often conducted to determine which type of land use is most appropriate for a particular location.
6) **Dr. Antaryami Mishra** in the review “Land Suitability Classification for Different Crops” proposing two orders(S and N) which reflect the kind of suitability (S for suitable and N for unsuitable land). Order "S" - Suitable land-Land on which sustained use for the defined purpose in the defined manner is expected to yield benefits that will justify required recurrent inputs without unacceptable risk to land resources. And Order "N"-Unsuitable land – Land having characteristics which appear to preclude its sustained use for the defined purpose in the defined manner or which would create production, upkeep and/or conservation problems requiring a level of recurrent inputs unacceptable at the time of interpretation.

TENTATIVE CHAPTER SCHEME:

Chapter I – introduction

Chapter II – Geographical setting of study region

Chapter III – Spatio-Temporal distribution of sugarcane crop in study area

Chapter IV – Agriculture Development in study area

Chapter V – Problem of sugarcane crop study area

Chapter VI – Farmland suitability of sugarcane crop

Chapter VII - conclusion and Suggestion.

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